

PERENOSA BAY SALMON FISHERIES

A Report to the Alaska Board of Fisheries, 2002

By
Kevin Brennan,
Donn Tracy,
Dennis Gretsches,
and
Jeff Wadle

Regional Information Report¹ No. 4K01-61

Alaska Department Fish and Game
Division of Commercial Fisheries
211 Mission Road
Kodiak, AK 99615

December 2001

¹ The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished division reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports in this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Division of Commercial Fisheries.

TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES	i
LIST OF FIGURES	ii
LIST OF APPENDICES	iii
ABSTRACT	1
INTRODUCTION	2
SALMON ENHANCEMENT AND REHABILITATION.....	2
PERENOSA BAY SALMON FISHERIES MANAGEMENT	3
Commercial Fisheries.....	3
Sport Fishery	5
Subsistence Fishery	6
SALMON ESCAPEMENT AND HARVESTS.....	6
Commercial Fisheries.....	7
Perenosa Bay Section.....	7
Pauls Bay (Statistical Area 251-83).....	7
Sport Fisheries.....	8
Subsistence Fisheries.....	9
LITERATURE CITED	10
TABLES	11
FIGURES	17
APPENDICES	28

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Commercial salmon harvest from the Perenosa Bay Section of the Kodiak Management Area, 1970-2001.....	11
2. Commercial salmon harvest from Pauls Bay (statistical area 251-83) in the Perenosa Bay Section of the Kodiak Management Area, 1982-2001.....	12
3. Fresh and saltwater angler catch, harvest and effort statistics from periodic creel surveys and the ADF&G Statewide Harvest Survey for the Perenosa Bay coho salmon sport fishery, 1987, 1998 and 2001.	13
4. Saltwater sport charter vessel angler effort and harvest of sockeye salmon between August 1 and September 8 at Pauls and Discoverer Bays, Afognak Island, 1998-2001.....	14
5. Saltwater sport charter vessel angler effort and catch of coho salmon between August 1 and September 8 at Pauls and Discoverer Bays, Afognak Island, 1998-2001.....	15
6. Subsistence salmon harvest from Pauls Bay, Pauls Lake, and Perenosa Bay, in the Kodiak Management Area, 1986-2001.	16

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Map of the Afognak identifying commercial salmon fishing sections and statistical areas in the Kodiak Management Area.....	17
2. Map of the Perenosa Bay Section identifying commercial salmon fishing statistical boundaries and closed water areas.....	18
3. Map of the Pauls Bay statistical area (251-83) identifying closed water areas in the Kodiak Management Area	19
4. Comparison of sockeye salmon escapement to the upper and lower escapement goals at Pauls Creek in the Kodiak Management Area, 1984 to 2001	20
5. Comparison of sockeye salmon escapement at Portage Creek in the Kodiak Management Area, 1984 to 2001	21
6. Comparison of pink salmon escapement to the upper and lower escapement objectives at Perenosa Bay in the Kodiak Management Area, 1984 to 2001	22
7. Comparison of coho salmon escapement to the upper and lower escapement goals at Pauls Creek in the Kodiak Management Area, 1984 to 2001.....	23
8. Annual commercial salmon harvest, by species, for the Perenosa Bay Section of the Kodiak Management Area, 1982 to 2001	24
9. Annual commercial salmon harvest, by species, for the Pauls Bay statistical area (251-831) of the Kodiak Management Area, 1982 to 2001	25
10. Saltwater charter vessel cumulative angler effort for sockeye salmon at Pauls Bay, Afognak Island, between 1999 and 2001	26
11. Saltwater charter vessel cumulative angler effort for coho salmon at Pauls Bay, Afognak Island, between 1998 and 2001	27

LIST OF APPENDICES

<u>Appendices</u>	<u>Page</u>
A. Primary management species and management chronology for the North Afognak/Shuyak Island Salmon Management Plan for the Kodiak Management Area, 2001.	29

ABSTRACT

In the Kodiak Management Area (KMA), the north end of Afognak Island comprises a myriad of bays and lagoons, with small streams and lakes supporting sockeye *Oncorhynchus nerka*, pink *O. gorbuscha* and coho *O. kisutch* salmon runs. The largest salmon producing area on the north end of Afognak Island is the Perenosa Bay complex, which is defined for the commercial salmon fishery as the Perenosa Bay Section. Within the Perenosa Bay Section are three distinct salmon systems: the Pauls, Portage, and Waterfall systems.

In the Perenosa Bay Section several systems have been the site of salmon enhancement and rehabilitation work for many years. Commercial salmon fisheries have been conducted in this area since at least the 1940s. Sport harvest of Perenosa salmon started in the 1950s, with the first guided sport harvest occurring in the early 1970s. Since 1990 growth of a guided sport charter boat and guided sport air charter industry led to increased competition for the salmon resources. This competition in turn has led to review of the management of the fisheries in this area by the Alaska Board of Fisheries (BOF) in recent years.

The department began collecting salmon escapement data for the Pauls Lake system through the use of fish pass counts in 1978. In 1983 a weir was constructed at the outlet of Pauls Lake, less than 0.25 miles from Pauls Bay. Sockeye salmon escapements into Pauls Lake have improved and have met escapement goals (20,000 to 40,000) in 1996, 1997, and 1999 to 2001. Pink salmon runs and subsequent escapements have been extremely variable since 1984 but overall have met the lower Perenosa escapement objective (20,000 to 60,000) 7 of 10 years from 1991 through 2000. In 2001 the pink salmon returns to Perenosa Bay systems were weaker than expected. Late or weak pink salmon runs led to restricted commercial fishing opportunities in the Perenosa Bay Section during August. This allowed early coho salmon returns to enter the system unimpeded. The Pauls Bay coho salmon runs have been strong and the escapements have increased since 1984. Pauls Lake coho escapements have met or exceeded the escapement goals (6,500 to 9,000) each year since 1992. The 2001 Pauls Lake coho escapement was a record 25,015 salmon. When the directed coho salmon commercial fishery opened on August 22, 2001, the Pauls coho escapement goal had already been exceeded.

Commercial salmon harvests from Pauls Bay from 1991 through 2000 have averaged 2,086 sockeye, 2,794 coho, and 15,429 pink salmon; in 2001 the catch included 26 sockeye, 17,215 coho, and 5,127 pink salmon. Sport fishing effort and catch of coho salmon in Perenosa Bay have increased in Pauls Bay. Total angler days, reported for chartered sport fishing vessels, at Pauls Bay in 2001 increased nearly 65% from 2000 and 126% from 1999. Total numbers of fish harvested increased from 530 to 1,455 during the same time period, and the overall reported catch nearly quadrupled. For Pauls and Perenosa Bays, from 1991 through 2000 the annual subsistence harvest has averaged 171 sockeye, 14 coho, and 1 pink salmon.

INTRODUCTION

In the Kodiak Management Area (KMA), the north end of Afognak Island comprises a myriad of bays and lagoons, with small streams and lakes supporting sockeye *Oncorhynchus nerka*, pink *O. gorbuscha* and coho *O. kisutch* salmon runs (Figure 1). The largest salmon producing area on the north end of Afognak Island is the Perenosa Bay complex, which includes Pauls, Discoverer, Delphin, Big Waterfall, Little Waterfall, and Phoenix Bays (Figure 2). This report provides background information on the salmon resources, and the commercial, sport, and subsistence fisheries that occur in the Perenosa Bay complex, with an emphasis on Pauls Bay.

For the commercial salmon fishery, the Perenosa Bay complex is defined as the Perenosa Bay Section, which includes the waters of Perenosa Bay south of a line extending from Cape Current to Posliedni Point (ADF&G 1999). Within the Perenosa Bay Section are three distinct salmon systems: the Pauls, Portage, and Waterfall systems. The Pauls and Portage Lake systems produce significant runs of sockeye salmon, and the Little Waterfall system is stocked annually with sockeye salmon. The Portage and Waterfall systems have produced significant pink salmon runs. The Pauls and Portage Lake systems have also produced strong runs of coho salmon. Commercial salmon fisheries have been conducted in this area since at least the 1940s. Sport harvest of Perenosa salmon started in the 1950s, with the first guided sport harvest occurring in the early 1970s. Since 1990 growth of a guided sport charter boat and guided sport air charter industry has led to increased competition for the salmon resources. This competition in turn has led to review of the management of the fisheries in this area by the Alaska Board of Fisheries (BOF) in recent years.

SALMON ENHANCEMENT AND REHABILITATION

Before Alaska became a state, the federal government was responsible for the management of Alaska's salmon resources. Under federal control Alaska's resources were heavily exploited and salmon escapements and production declined severely. In 1951 the territorial legislature created the Alaska Department of Fisheries (ADF) to preserve and rebuild the salmon runs. As a way to rebuild depleted runs and protect healthy stocks, the ADF focused on the enhancement of the sockeye salmon fisheries (Schrof et al. 2000).

In the Perenosa Bay Section several systems have been the site of salmon enhancement and rehabilitation work for many years (Schrof et. al. 2000). In the northeast corner of Perenosa Bay, fish migrations into the upper reaches of the Pauls Lake system were previously blocked by physical barriers (there are three connected lakes, Pauls, Laura, and Gretchen, that drain into Pauls Bay, separated by short steep creeks). Prior to an ADF salmon enhancement project in the early 1950s, sockeye salmon escapement into the Pauls Lake system was limited to only a few hundred fish and spawning habitat was underutilized in the upper drainage areas due to the barriers (ADF 1951; Honnold and Edmundson 1993). Sockeye salmon eggs were planted in a Laura Lake tributary from 1951 through 1955 to initiate adult returns and to enhance overall sockeye salmon production. The installation of fishways in 1952 enabled returning adult salmon access around the barriers. By the late 1950s the sockeye salmon run was well established throughout the Pauls Lake drainage. In 1959 a 9-meter steep pass was installed at the original

fishway site. In 1964 a 27-meter steep pass was installed by the department at the highest barrier on this system (at Laura Creek). Modifications and improvements were continued at both sites in the 1970s and 1980s by adding more steep passes, resting pools, and water diversion structures (Honnold and Edmundson 1993).

Pink salmon enhancement occurred at Little Waterfall Creek (in the northwest corner of Perenosa Bay) in the late 1970s (McDaniel 1981; Honnold 1999). The installation of three fishpasses allowed for colonization of previously unused spawning habitat. By the early 1980s pink salmon production increased enough at Little Waterfall to allow annual commercial harvests in Perenosa Bay. The Little Waterfall system has recently been the site of extensive enhancement work, with fish pass remodeling and stocking, with the intent of increasing pink, sockeye, and coho salmon returns (Honnold 1999).

Another fish pass was installed at Portage Creek (in Discoverer Bay) in the early 1970s to enhance pink salmon, though it also increased sockeye and coho salmon production (White and Edmundson 1993).

The Kodiak Regional Aquaculture Association (KRAA) was established in 1983 to provide the public and user-groups assistance in the process of restoring and enhancing salmon production in the KMA. KRAA and Alaska Department of Fish and Game (ADF&G) were involved in limnological monitoring studies of lakes and ongoing lake fertilization to increase salmon fry growth and survival. Lake fertilization is currently taking place on Laura and Little Waterfall Lakes. Also, stocking of sockeye salmon has occurred at Pauls and Laura Lakes and is currently occurring at Little Waterfall and Big Waterfall Lakes. Backstocking of sockeye salmon fry or presmolt into Pauls or Laura Lakes for rehabilitation purposes has not occurred for several years, due to these systems increased run strength. All funding for the maintenance and operation of the fishpasses comes from an enhancement tax that is paid by KMA commercial salmon fishers, through KRAA.

PERENOSA BAY SALMON FISHERIES MANAGEMENT

Commercial Fisheries

The Afognak District is designated as a seine only commercial fishing area. There are 385 purse seine and 36 beach seine permits available for the KMA, making this the second largest seine fleet in the state. Commercial fisheries statistical areas were modified in 1982 to allow discrimination of the catches from within management sections of the KMA.

The management strategy guiding the commercial fisheries of the north Afognak area was developed in the 1970s and early 1980s by the ADF&G, Division of Commercial Fisheries (CF), management staff. This management strategy, while not in regulation, was used throughout the 1980s and early 1990s. In November 1995 the BOF put into regulation the North Afognak/Shuyak Island Salmon Management Plan (5AAC 18.368; Appendix A) governing all commercial salmon fisheries on the north end of the KMA. The goal of this plan is to achieve escapement and harvest objectives of sockeye, pink, and coho salmon returning to spawning systems located in the

Northeast Afognak, Perenosa Bay, Shuyak Island, and Northwest Afognak Sections of the Afognak District (Figure 1).

A terminal harvest area (THA) is defined near the mouth of Little Waterfall Creek, the site of pink and sockeye salmon enhancement projects. This THA was first defined in regulations for the 1996 season. The Waterfall Bay THA was modified in 1999 to include the waters of Big and Little Waterfall Bays (5AAC 18.376; Figure 2).

The North Afognak/Shuyak Island Salmon Management Plan details the key species and targeted stocks that are managed for in each of these sections throughout the fishing season (ADF&G 1999). For the Perenosa Bay Section:

- From June 9 to July 5 commercial fishing opportunities are to be based on sockeye salmon returning to the Pauls Bay and Portage Lake systems. Additional fishing time may be allowed to harvest enhanced sockeye salmon bound for the Little Waterfall system, but only inside the defined Waterfall Bay THA.
- From July 6 to July 20 management for the Perenosa Bay Section is based on Pauls and Portage sockeye salmon and local and mixed pink salmon.
- From July 21 to August 20 management is based on the abundance of local and mixed pink salmon.
- From August 21 to September 5 management is based on local pink and coho salmon.
- After September 5 commercial fishing opportunities are based on the abundance of local coho salmon.

In the Perenosa Bay Section the commercial salmon fishery in the Waterfall Bay THA opens on June 9 with fishing remaining open continuously through early July. This is a put-and-take enhancement project with all sockeye salmon returning to the area intended for common property harvest. The initial salmon fishing period for the Pauls and Portage Lakes sockeye systems are not expected to begin until June 14, and then will occur only if there are sockeye surplus to escapement requirements (Brennan *in press*).

The department began collecting salmon escapement data for the Pauls Lake system through the use of fish pass counts in 1978. In 1983 a weir was constructed at the outlet of Pauls Lake, less than 0.25 miles from Pauls Bay, to more timely and accurately assess salmon escapements. Funding for the Pauls Bay weir in the 1980s through early 1990s was from general state funds through the ADF&G CF; more recently funding has come from KRAA. From 1987 to 1993 and 1999 to 2001 a weir has also been operated on Portage Creek. Funding for this weir in recent years has been from KRAA. Additionally, aerial surveys are flown by department CF biologists to monitor build-ups of salmon in the bays and estimate escapement into other area streams. Escapement counts through the Pauls Bay and Portage weirs are used as indicators of escapement to the other salmon systems of the north Afognak and Shuyak Islands area.

The KMA harvest strategy for pink salmon utilizes a fixed opening date of July 6 and a pink salmon forecasting program to set the length of the initial fishing periods. In contrast to sockeye management, the initial fishing periods for pink salmon are set preseason and are dependent on the magnitude of the forecasted pink salmon harvest. Based on the predicted strength of the pink salmon run, fixed weekly fishing periods are planned for July and early August. These periods may

range from 2.5 to 4.5 days per week. Significant deviation from these prescheduled openings normally does not occur until the fifth period, on or about August 3 to August 6. By this time a fairly realistic assessment of pink salmon run strength should be available, provided that normal run timing occurs.

To afford additional protection to returning salmon, there are large closed water sanctuaries at Discoverer and Pauls Bays. At Pauls Bay from June 9 through July 31, closed waters for commercial salmon fishing are all waters within approximately 0.5 miles (~900 yards) of the terminus of Pauls Creek (Figure 3). This large closed water sanctuary was instituted to protect and help rebuild the early sockeye salmon run to Pauls Creek.

In 1999 the BOF modified the North Afognak/Shuyak Island Salmon Management Plan in response to a few sport fish operators concerns regarding pink and coho salmon management. During the 1990s Pauls Lake coho salmon runs increased. The entire section is managed based on pink salmon run strength through August 20. In years of weak or late pink salmon runs, commercial fishing periods were reduced or commercial fishing was closed through at least August 21. Early coho salmon returning to the Pauls Lake system built-up and escaped in large numbers. When the coho salmon escapement exceeded the established interim goals, “mop-up” fisheries were allowed, with the closed water area at Pauls Creek reduced to provide maximum harvest opportunity. At times closed waters were reduced to within 50 yards of the stream terminus to mop-up excess coho salmon. Announcement of these mop-up fisheries drew commercial fishing effort to the area and created conflict between the sport and commercial users that were operating at the mouth of the stream simultaneously.

In order to reduce the number of mop-up fisheries, the BOF modified the commercial fishing regulations in 1999 so that the closed waters area at Pauls Bay is automatically reduced on August 1 to those waters within approximately 0.4 miles (~700 yards) of the terminus of Pauls Creek (those waters east of a line from 58° 23.70' N lat., 152° 20.80' W long., to 58° 23.29' N lat., 152° 21.09' W long.). However, if the Pauls Bay coho salmon escapement goal is exceeded, closed waters can only be reduced to east of 152° 20.80' W long, a line approximately 400 to 700 yards from the stream terminus (Figure 3).

Sport Fishery

The Perenosa Bay salmon sport fishery targets coho and to a much lesser extent sockeye and pink salmon. The sport fishery primarily occurs on concentrations of salmon that buildup near the stream terminus, prior to the spawning migration. At times several thousands of salmon are available to the sport fishery and angler success is generally very high. A significant portion of the annual effort is composed of chartered vessels operating from Kodiak and remote lodges on Afognak Island. Both guided and unguided fly-in groups of anglers from the Alaska mainland (Bristol Bay and Homer lodges) and Kodiak also participate in the fishery. Coho salmon in saltwaters are generally bound for Pauls and Portage Lakes, while sockeye salmon are generally bound for Pauls Lake.

Starting in 1996 daily sport fish bag and possession limits for Perenosa Bay coho and sockeye salmon have annually been set at five fish per day and ten in possession. As with the commercial

fishery occurring in the Perenosa Bay Section, the sport fishery is managed inseason using escapement goals established for both species, which are based on historic stock abundance and run timing. Inseason restrictions on the sport fishery have occurred only once during the past 10 years. In 2001 the bag and possession limit for sockeye salmon in Pauls Bay and the Pauls Lake watershed was reduced to two fish, due to a poor return that, at the time, was not expected to reach the minimum escapement goal.

Since 1998 information on annual angler activity in the sport guided, saltwater portion of the salmon fishery has been available through an ADF&G Saltwater Charter Vessel Logbook Program. Statistics generated from logbook data are used to document chartered vessel use patterns in the fishery, and serve as the best indicator of recent trends in angler harvest and effort.

Subsistence Fishery

State and federal regulations guide subsistence fishing in the waters around Afognak Island. The freshwater systems of Afognak Island, which are relatively small, easily accessible, and at risk of overexploitation, are closed to subsistence fishing for salmon. ADF&G annually issues subsistence salmon permits, with the primary intent of obtaining harvest data. Subsistence fishers are requested to return their permits after the salmon season, listing areas fished by date and salmon harvest by species. Legal gear, in accordance with Alaska laws, is limited to 50 fathoms of gillnet, except before June 1 and after September 15 when purse seines may be used. The Perenosa Bay area falls within waters designated as eligible under federal subsistence regulations, which allow for the use of rod and reel for subsistence fishing. While there is no annual limit in the KMA on the taking of salmon for subsistence purposes, there is a limit of 25 salmon per person listed on the permit (additional members of the same household may be included on an individual's permit).

SALMON ESCAPEMENT AND HARVESTS

Sockeye salmon escapements into Pauls Lake met the lower goal only twice between 1984 and 1995 (Figure 4). However, runs have improved and Pauls Lake sockeye escapements have met escapement goals (20,000 to 40,000) in 1996, 1997, and 1999 to 2001. In 2001 sockeye salmon escapement for Pauls Lake (23,221) was higher than the previous 10-year average (1991-2000; 19,749). Portage Lake sockeye salmon escapements have met the desired level (5,000 to 10,000) almost every year since 1991, except in 1998 (4,200) and 2001 (3,147; Figure 5). The 2001 escapement for Portage Creek was also below the previous 10-year average (1991-2000; 6,981).

Pink salmon runs and subsequent escapements into Perenosa Bay systems have been extremely variable since 1984 (Figure 6). Overall, the pink escapements to Perenosa Bay have met the lower escapement objective (20,000 to 60,000) 7 of 10 years from 1991 through 2000. In 1999 pink salmon runs were significantly delayed but eventually came in as projected. During 2000 and 2001 the pink salmon returns to Perenosa Bay systems were weaker than expected, with the escapement objective eventually met in 2000 (49,100) but not in 2001 (6,000).

The Pauls Bay coho salmon runs have been strong and the escapements have increased since 1984 (Figure 7). Pauls Lake coho escapements have met or exceeded the escapement goals (6,500 to 9,000) each year since 1992. The 2001 Pauls Lake coho escapement was a record 25,015 salmon, 2.3 times greater than the recent 10-year (1991-2000) average escapement (10,913). Closed waters at Pauls Bay were automatically reduced on August 1, but coho escapements exceeded desired levels in 1999, 2000, and 2001. Perenosa pink salmon returns had been late or weak, leading to restricted commercial fishing opportunities in the Perenosa Bay Section during August. This allowed early coho salmon returns to enter the system unimpeded. When the directed coho salmon commercial fishery opened on August 22, 2001, the Pauls coho escapement goal had already been exceeded.

Commercial Fisheries

Commercial salmon fishing effort and harvest from the Perenosa Bay Section has been extremely variable. The department established more specific harvest reporting areas (statistical areas) for the KMA in 1982. This allows discrimination of the commercial harvest within the Perenosa Bay Section from 1982 to present (Tables 1 and 2).

Perenosa Bay Section

For the 10-year period 1991 through 2000, an average of 17 purse seine vessels have made landings from the Perenosa Bay Section; the commercial salmon harvest averaged 13,384 sockeye (range 4 to 41,481), 6,213 coho (range 251 to 23,071), and 71,208 pink (range 319 to 491,990) salmon (Table 1, Figure 8). In 1999 a total of 15 seiners made deliveries from the Perenosa Bay Section, with a total harvest of 25,645 sockeye, 2,752 coho, and 17,369 pink salmon. In 2000 the total harvest was 9,016 sockeye, 12,302 coho, and 11,964 pink salmon from 22 different seine vessels. In 2001 only 11 seine permit holders made deliveries from the Perenosa Bay Section, with a total harvest of 16,049 sockeye, 21,518 coho, and 5,481 pink salmon.

Pauls Bay (Statistical Area 251-83)

For only that portion of the Perenosa Bay Section near Pauls Bay (statistical area 251-83, which include Pauls and Phoenix Bay), for the 10-year period 1991 through 2000 the annual commercial harvest has averaged 2,086 sockeye (range 6 to 14,669), 2,794 coho (range 371 to 12,823), and 15,429 pink (range 62 to 73,387) salmon (Table 2, Figure 9). In 1999 harvests were made by 11 seiners permit holders from the Pauls Bay statistical area, with a total harvest of 14,669 sockeye, 2,285 coho, and 1,041 pink salmon. In 2000 deliveries were made by 13 seine permit holders for a total harvest of 268 sockeye, 6,286 coho, and 11,106 pink salmon. In 2001 only 5 seiners harvested 26 sockeye, 17,215 coho, and 5,127 pink salmon.

Sport Fisheries

Historically, sport angler catch, harvest, and effort information has been available on a sporadic basis. Prior to 2000 low numbers of Perenosa Bay anglers responding to the department's Statewide Sport Fish Harvest Survey precluded the generation of reliable, area-specific estimates of coho and sockeye salmon harvest and effort. An onsite creel survey of sport fishing for coho salmon in Pauls Bay, Pauls Lake, and at Portage Creek, conducted by the department in 1987, revealed relatively low levels of angling activity at that time, with an estimated 748 coho salmon harvested during the season. By contrast, results of a department creel census completed in 1998, as well as harvest and effort estimated from the 2000 statewide survey, showed a significant increase in angling effort and harvests at Pauls Bay (Table 3).

Data summarized from the charter vessel program indicated that effort and harvest on sockeye salmon in Perenosa Bay principally occurred during the 30 day period in June and July. During the most recent three-year period, 50% of the total charter vessel angling has been completed by July 1 and 95% by July 20 (Figure 10). Nearly all sockeye harvested in saltwater from chartered vessels between 1999 and 2001 have been reported at Pauls Bay, with a small amount of sockeye salmon effort occurring in Discoverer Bay during 2001. Recent levels of sport effort and harvest rates on sockeye salmon in each area are given in Table 4. At Pauls Bay, charter vessel angler effort, harvest rates, and overall catch of sockeye salmon declined during 2001 by comparison to the preceding two years. The decline is likely related to the weak return of sockeye salmon to Pauls Lake, which resulted in an inseason reduction in the bag limit. The harvest of 417 sockeye by charter operators in 2001 comprised less than 50% of the 1,037 sockeye harvest recorded during the preceding year. Total days of angler effort decreased 36% between years, even though the daily average number of anglers frequenting the fishery decreased by one person.

Current charter vessel angler effort targeting coho salmon returning to Pauls Bay generally commences near the end of July and concludes during the first week in September (Figure 11). Over the preceding four years an average of 50% of fishing effort attributable to this angler group has been completed prior to August 20. Levels of charter vessel angler effort targeting coho salmon changed notably during 2001 in comparison to the previous three seasons, with total angler days at Pauls Bay increasing nearly 65% from 2000 and 126% from 1999 (Table 5). Total numbers of fish harvested increased from 530 to 1,455 during the same time period, and the overall reported catch nearly quadrupled. Accordingly, the average daily catch per angler of coho salmon increased from three to five fish between the 1999 and 2001 season. Record numbers of adult coho salmon returning to the Pauls Bay drainage in 2001 most likely contributed to the increased angler success rate.

At Discoverer Bay coho salmon catch and effort by charter vessel anglers decreased markedly between 2000 and 2001, with total angler days falling from 354 to 39, respectively (Table 5). Likewise, the overall harvest of coho salmon by charter vessel anglers declined from 881 fish in 2000 to 97 during 2001. Daily catch rates per angler remained static, at 4 fish during both seasons.

The most recent four-year trend in charter vessel angler activity suggests that overall interest in salmon sport fishing in the Pauls Bay area has increased. During the same time period, decreased charter vessel effort has occurred in Discoverer Bay. There is a lack of consistent information on

angler effort on other systems within Perenos Bay that makes it less clear whether sport fishing activity in general has increased in this bay complex.

Subsistence Fisheries

Subsistence harvest data is gathered from returned subsistence permits that showed a harvest. For Pauls and Perenos Bays for the 10-year period 1991 through 2000, the annual subsistence harvest has averaged approximately 171 sockeye (range 4 to 283), 14 coho (range 0 to 55), and 1 pink salmon (range 0 to 4) from six fishers (Table 6). In 1999 seven fishers reported harvests of 283 sockeye, 3 coho, and 2 pink salmon. Nine subsistence fishers took 210 sockeye, 55 coho, and 0 pink salmon in 2000. For 2001 subsistence harvest reports are only preliminary so are not reported here.

LITERATURE CITED

- ADF. 1951. Third annual report of the Alaska Fisheries Board and Alaska Department of Fisheries. Report No. 3, Juneau.
- ADF&G. 1987. Sport Fish Division Report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Anchorage.
- ADF&G (Alaska Department of Fish and Game). 1999. Regulations of the Alaska Board of Fisheries for Commercial Fishing in Alaska; 1999-2001 Cook Inlet, Kodiak, and Chignik Areas. Alaska Department of Fish and Game, Commercial Fisheries Management and Development Division, Juneau.
- Brennan, K. 2001. Kodiak Management Area commercial salmon annual management report, 2001. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K01-62, Kodiak.
- Honnold, S.G. and J.A. Edmundson. 1993. Limnological and fisheries assessment of sockeye salmon (*Oncorynchus nerka*) production in the Laura Lake system. Alaska Department of Fish and Game, FRED Division Report Series 130
- Honnold, S.G. 1999. Little Waterfall Creek Barrier Bypass Improvement: Pink (*Oncorynchus gorbuscha*) and coho (*Oncorynchus kisutch*) salmon habitat enhancement. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K99-57, Kodiak
- Howe, A. L., R. J. Walker, C. Olnes, K. Sundet, and A. E. Bingham. *In press*. Participation, catch, and harvest in Alaska sport fisheries during 2000. Alaska Department of Fish and Game, Fishery Data Series, Anchorage.
- McDaniel, T.R. 1981. Evaluation of pink salmon fry plants at Seal Bay Creek, Afognak Island, Alaska. Alaska Department of Fish and Game, Division of Commercial Fisheries Informational Leaflet No. 193, 9p.
- Schwarz, L and M. Clapsadl. 2000. Area management report for the recreational fisheries of the Kodiak and Alaska Peninsula/Aleutian Islands Regulatory Areas, 1997 and 1998. Alaska Department of Fish and Game, Fisheries Data Series Report No. 00-01, Anchorage.
- Schrof, S.T., S.G. Honnold, C.J. Hicks and J.A. Wadle. 2000. A summary of salmon enhancement, rehabilitation, evaluation, and monitoring efforts conducted in the Kodiak Management Area through 1998. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 4K00-57, Kodiak
- White, L.E. and J.A. Edmundson. 1993. Potential for Sockeye salmon enhancement of Portage Lake, Afognak Island. Alaska Department of Fish and Game. FRED Division Report 129, Juneau.

Table 1. Commercial salmon harvest from the Perenosa Bay Section of the Kodiak Management Area, 1970-2001.

Year	Permits	Landings	Number of Salmon ^a					Total
			Chinook	Sockeye	Coho	Pink	Chum	
1970 ^b	*	*	*	*	*	*	*	*
1971	0	0	0	0	0	0	0	0
1972 ^b	*	*	*	*	*	*	*	*
1973 ^b	*	*	*	*	*	*	*	*
1974 ^b	*	*	*	*	*	*	*	*
1975	7	16	16	42	3,168	1,771	35	5,032
1978	20	37	6	6,200	3,742	18,885	1	28,834
1979	33	62	31	12,520	10,126	18,527	110	41,314
1980	25	50	0	714	13,509	29,771	2,250	46,244
1981	38	146	15	30,015	10,482	135,254	3,360	179,126
1982	73	184	0	22,898	40,942	103,038	13,523	180,401
1983	36	58	20	5,186	7,808	9,337	260	22,611
1984	28	47	0	5,965	14,307	12,532	84	32,888
1985	36	60	0	2,095	21,155	83,953	4	107,207
1986	11	17	0	3,281	2,200	62,594	640	68,715
1987	14	23	1	476	4,201	22,361	31	27,070
1988	32	146	34	1,388	20,865	343,386	1,166	366,839
1989 ^c	0	0	0	0	0	0	0	0
1990	18	48	0	435	4,282	61,819	134	66,670
1991	7	7	1	35	251	10,037	30	10,354
1992 ^b	*	*	*	*	*	*	*	*
1993	6	16	24	82	466	137,500	62	138,134
1994	12	16	6	139	2,516	23,368	169	26,198
1995	25	127	7	18,397	6,299	491,990	397	517,090
1996	23	59	1	41,481	1,608	319	45	43,454
1997	31	48	11	27,905	23,071	13,809	40	64,836
1998	24	47	141	11,135	12,528	3,374	131	27,309
1999	15	46	21	25,645	2,752	17,369	360	46,147
2000	22	39	5	9,016	12,302	11,964	90	33,377
2001	11	36	3	16,049	21,518	5,481	25	43,076
<u>Average - Past Ten Years:</u>								
1992-2001	17	44	22	14,985	8,340	70,752	132	94,231
<u>Average - Previous Decades:</u>								
1991-2000	17	41	22	13,384	6,213	71,208	132	90,959
1980-1990 ^c	31	78	7	7,245	13,975	86,405	2,145	109,777
1970-1979	7	12	5	1,918	1,723	4,409	24	8,080
<u>Average - Overall</u>								
1970-2001 ^c	17	42	11	7,548	7,520	50,803	720	66,601

^a From ADF&G Fish Ticket summaries.

^b Confidential data.

^c No commercial fisheries were allowed due to the M/V Exxon Valdez oil spill. 1989 not included in averages.

Table 2. Commercial salmon harvest from Pauls Bay (statistical area 251-83) in the Perenosa Bay Section of the Kodiak Management Area, 1982-2001.

Year	Permits	Landings	Number of Salmon ^a					Total
			Chinook	Sockeye	Coho	Pink	Chum	
1982	49	86	0	19,667	20,591	16,510	12,307	69,075
1983	23	32	3	4,195	5,976	1,082	33	11,289
1984	13	21	0	3,146	4,691	1,671	3	9,511
1985	22	27	0	1,242	7,704	10,602	0	19,548
1986	0	0	0	0	0	0	0	0
1987	4	4	1	183	390	5,804	0	6,378
1988	20	67	23	740	6,527	145,130	868	153,288
1989 ^b	0	0	0	0	0	0	0	0
1990	12	21	0	290	1,788	18,605	78	20,761
1991 ^c	*	*	*	*	*	*	*	*
1992 ^c	*	*	*	*	*	*	*	*
1993	4	7	3	55	371	48,203	53	48,685
1994	4	5	4	102	591	12,154	127	12,978
1995	10	15	4	783	1,356	73,387	228	75,758
1996	16	18	0	4,921	1,483	287	30	6,721
1997	9	9	0	15	12,823	2,165	1	15,004
1998	4	5	0	6	2,396	62	0	2,464
1999	11	25	7	14,669	2,285	1,041	287	18,289
2000	13	17	3	268	6,286	11,106	90	17,753
2001	5	9	0	26	17,215	5,127	22	22,390
<u>Average - Past Ten Years:</u>								
1992-2001	8	11	2	2,085	4,514	15,588	84	22,273
<u>Averages:</u>								
1991-2000	8	11	2	2,086	2,794	15,429	85	20,395
1982-1990 ^b	18	32	3	3,683	5,958	24,926	1,661	36,231
<u>Average - Overall</u>								
1982-2001 ^b	12	20	3	2,650	4,885	18,885	745	27,168

^a From ADF&G Fish Ticket summaries.

^b No commercial fisheries were allowed due to the M/V Exxon Valdez oil spill. 1989 not included in averages.

^c Confidential data.

Table 3. Fresh and saltwater angler catch, harvest and effort statistics from periodic creel surveys and the ADF&G Statewide Harvest Survey for the Perenosa Bay coho salmon sport fishery, 1987, 1998 and 2001.

Year	Anglers		Coho Salmon Catch	
	Number	Effort	Harvested	Released
Pauls Bay/Pauls Lake:				
1987	na	729 angler hours	159	na
1998	na	311 angler days	804	1,378
2000	214	1,375 angler days	995	1,343
Discoverer Bay/Portage Creek:				
1987	na	1,972 angler hours	589	na
1998	na	263 angler days	487	1,267

Source: ADF&G 1987 (creel survey results; effort and harvest values estimated); Schwarz and Clapsadl 2000 (creel census results, saltwater fishing only; effort and harvest values actual); Howe et al. *in press* (ADF&G statewide sportfish harvest survey results, saltwater fishing only; effort and harvest values estimated).

Table 4. Saltwater sport charter vessel angler effort and harvest of sockeye salmon between August 1 and September 8 at Pauls and Discoverer Bays, Afognak Island, 1998-2001.

Year	Daily Angler Effort ^a			Season Total	Daily Sockeye Harvested			Season Total	Daily Harvest per Angler		
	Min ^a	Max	Avg.		Min	Max	Avg		Min	Max	Avg
Pauls Bay:											
1998	na ^b	na	na	na	na	na	na	na	na	na	na
1999	2	11	2	88	5	43	19	310	4	8	4
2000	2	14	6	227	10	70	43	1,037	5	7	5
2001	2	12	5	177	4	52	13	417	4	3	2
Discoverer Bay:											
2001	6	6	6	18	15	30	24	72	3	5	4

Source: Unpublished data from the ADF&G Saltwater Charter Vessel Logbook Program; 2001 results preliminary.

^a Does not include days with zero angler effort.

^b Not available.

^c No harvest or effort recorded prior to 2001, during which all angling activity occurred during a three day period.

Table 5. Saltwater sport charter vessel angler effort and catch of coho salmon between August 1 and September 8 at Pauls and Discoverer Bays, Afognak Island, 1998-2001.

Year	Daily Angler Effort			Season Total	Daily Coho Harvested			Season Total	Daily Coho Released			Season Total	Daily Catch per Angler			Total Catch
	Min ^a	Max	Avg		Min	Max	Avg		Min	Max	Avg		Min	Max	Avg	
Pauls Bay:																
1998	2	21	6	253	6	57	22	847	na	na	na	na	na	na	na	na
1999	2	18	5	211	0	56	14	530	0	20	4	109	0	14	3	639
2000	1	36	7	290	0	110	22	861	1	50	20	326	1	14	4	1,184
2001	1	29	12	478	0	129	37	1,455	0	101	23	916	0	10	5	2,371
Discoverer Bay:																
1998	2	12	2	82	5	40	17	222	na	na	na	na	na	na	na	na
1999	2	15	5	180	0	55	18	435	0	37	5	116	0	7	3	551
2000	1	23	9	354	0	84	27	881	0	44	11	349	1	8	4	1,230
2001	1	13	1	39	0	25	14	97	0	30	16	114	0	8	4	211

Source: Unpublished data from the ADF&G Saltwater Charter Vessel Logbook Program; 2001 results preliminary.

^a Does not include days with zero angler effort.

^b Not available.

Table 6. Subsistence salmon harvest from Pauls Bay, Pauls Lake, and Perenos Bay, in the Kodiak Management Area, 1986-2001.

Year	Permits With Catch ^b	Number of Salmon ^a					Total
		Chinook	Sockeye	Coho	Pink	Chum	
1986	8	0	22	114	0	0	136
1987	2	0	65	15	0	0	80
1988	3	0	143	6	17	0	166
1989	8	0	276	59	2	0	337
1990	8	0	71	46	0	0	117
1991	3	0	182	0	0	0	182
1992	8	0	159	40	0	0	199
1993	5	0	179	0	0	0	179
1994	5	0	4	10	4	0	18
1995	7	0	211	0	0	0	211
1996	5	0	132	0	0	0	132
1997	4	0	222	25	2	0	249
1998	4	0	126	8	0	0	134
1999	7	1	283	3	2	0	289
2000	9	0	210	55	0	0	265
2001 ^c	3	0	103	0	0	0	103
<u>Average - Past Ten Years:</u>							
1992-2001 ^c	6	0	163	14	1	0	178
<u>Averages:</u>							
1991-2000	6	0	171	14	1	0	186
<u>Average - Overall</u>							
1986-2000	6	0	149	24	2	0	175

^a From the ADF&G Subsistence database.

^b Figures reflect information from subsistence permits returned to ADF&G. This represents only a minimum estimate of subsistence use.

^c 2001 data is preliminary.

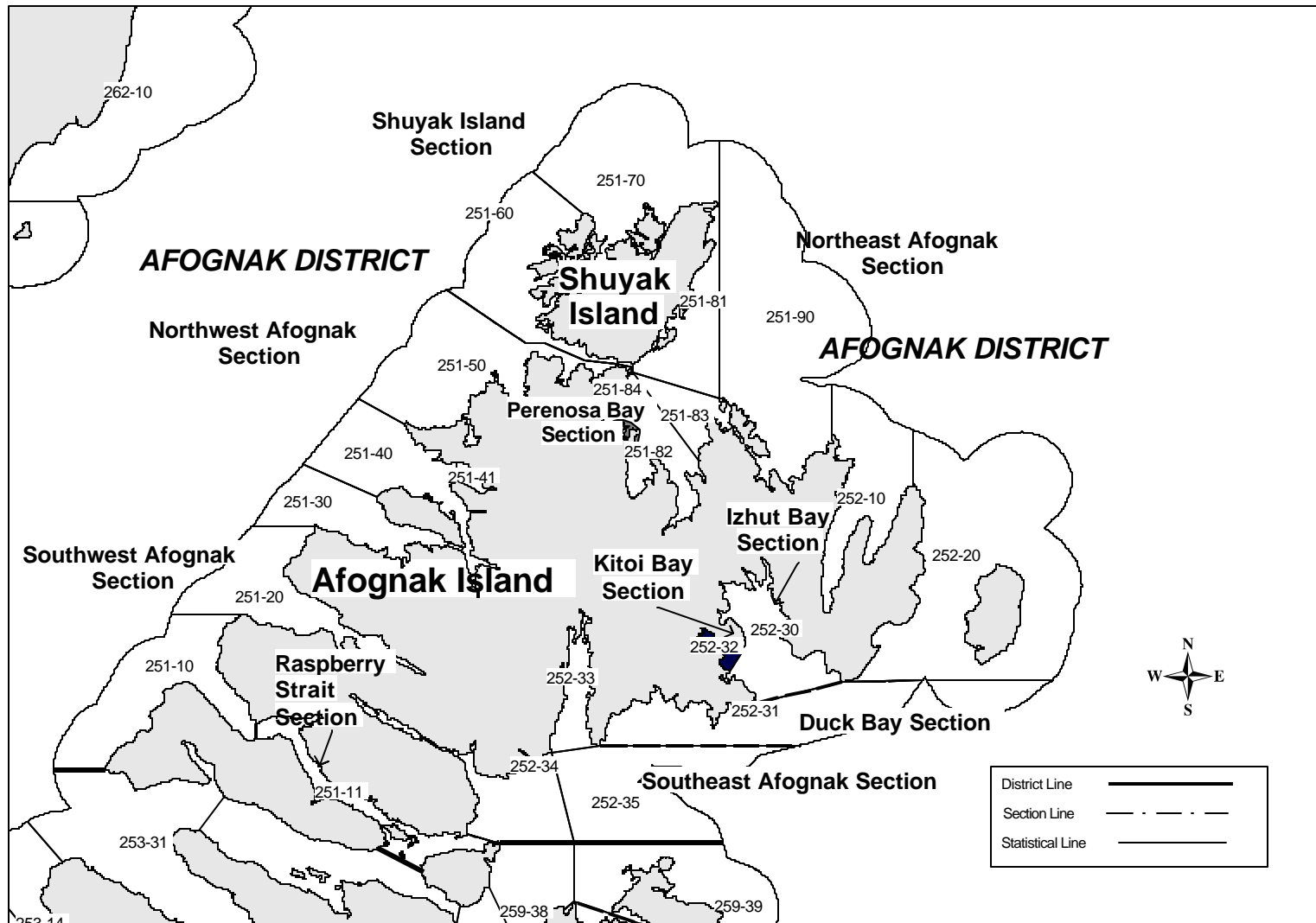


Figure 1. Map of the Afognak District identifying commercial salmon fishing sections and statistical areas in the Kodiak Management Area.

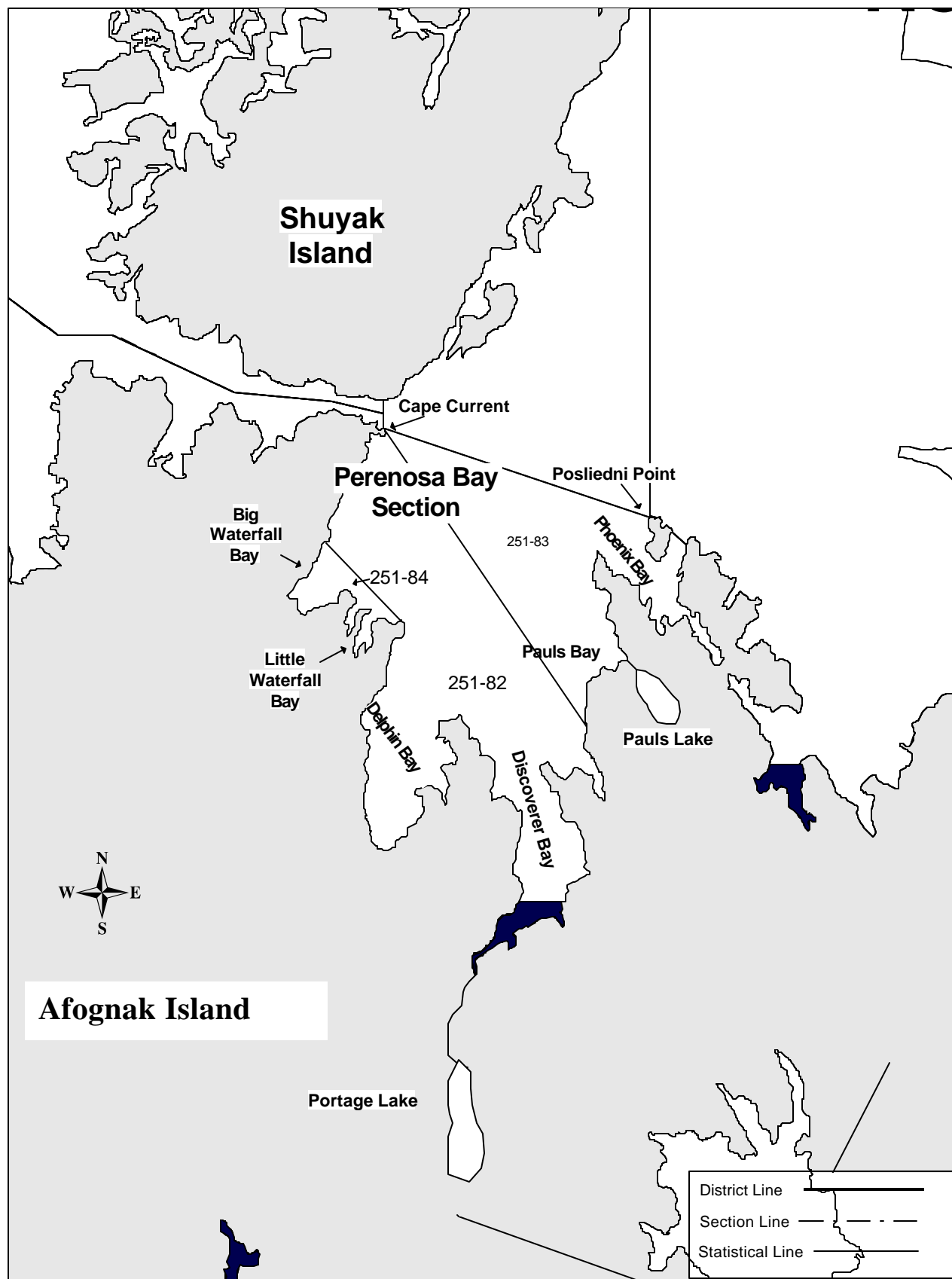


Figure 2. Map of the Perenosa Bay Section identifying commercial salmon fishing statistical boundaries and closed water areas.

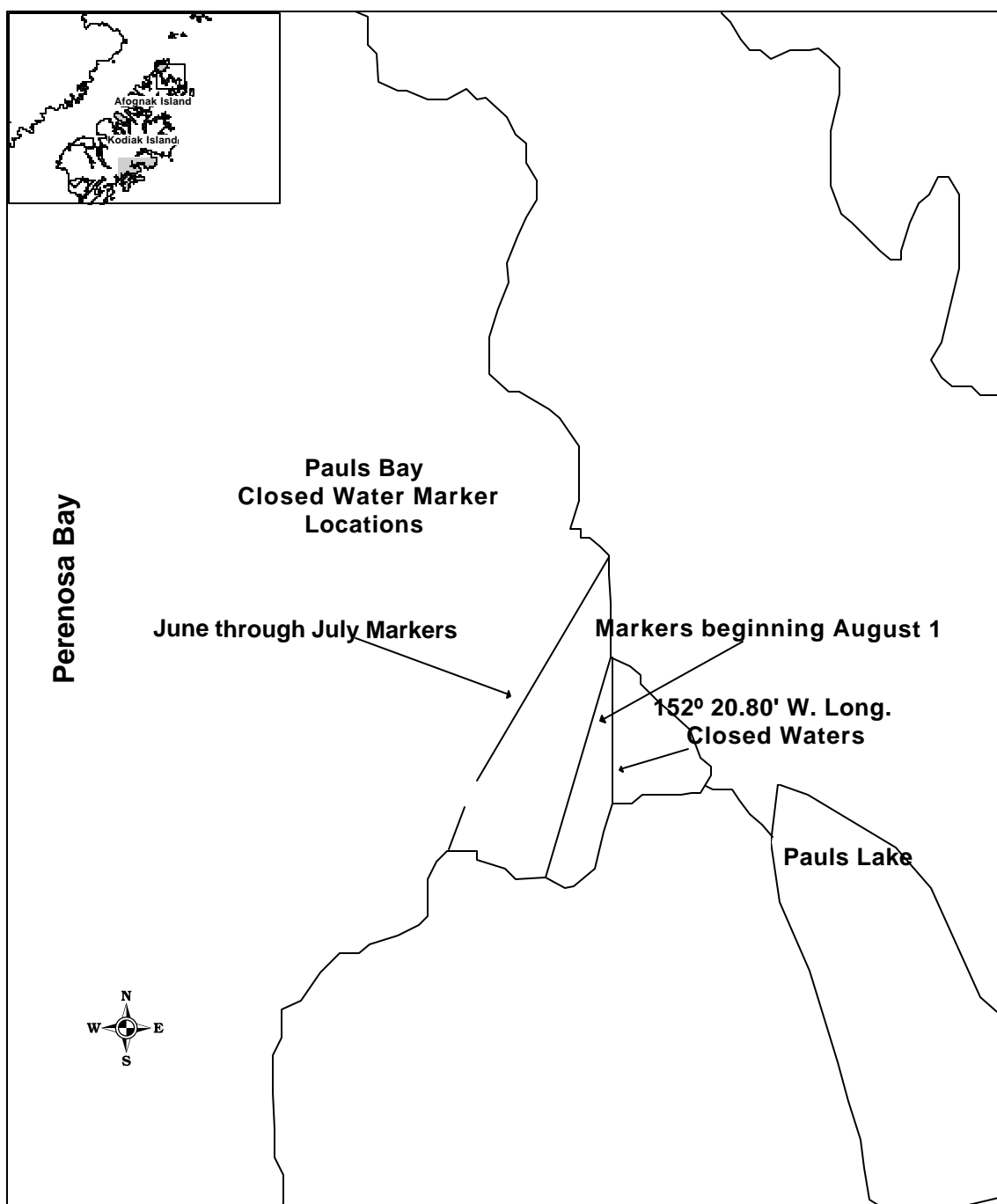


Figure 3. Map of the Pauls Bay statistical area (251-83) identifying closed water areas in the Kodiak Management Area.

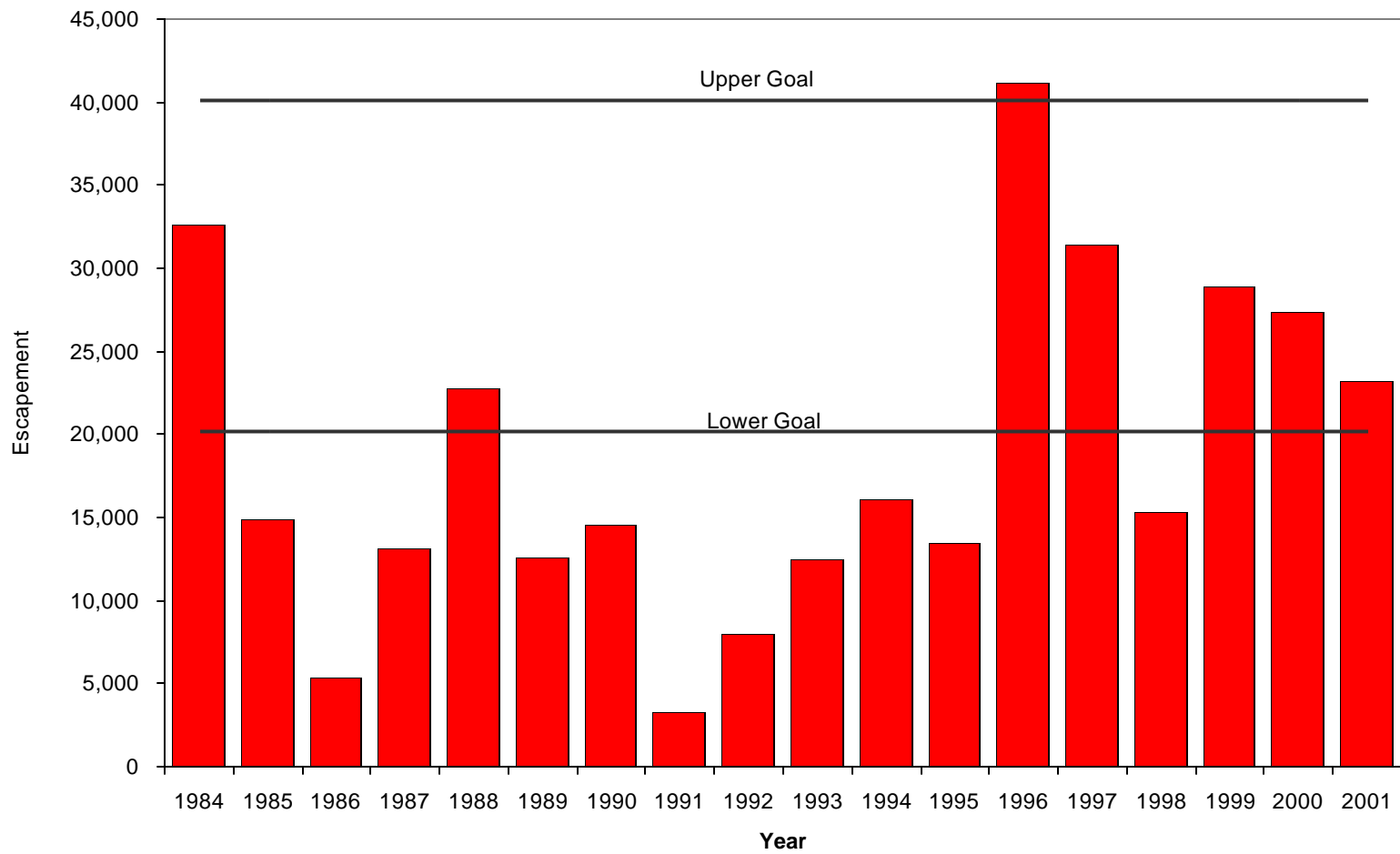


Figure 4. Comparison of sockeye salmon escapement to the upper and lower escapement goals at Pauls Creek in the Kodiak Management Area, 1984 to 2001.

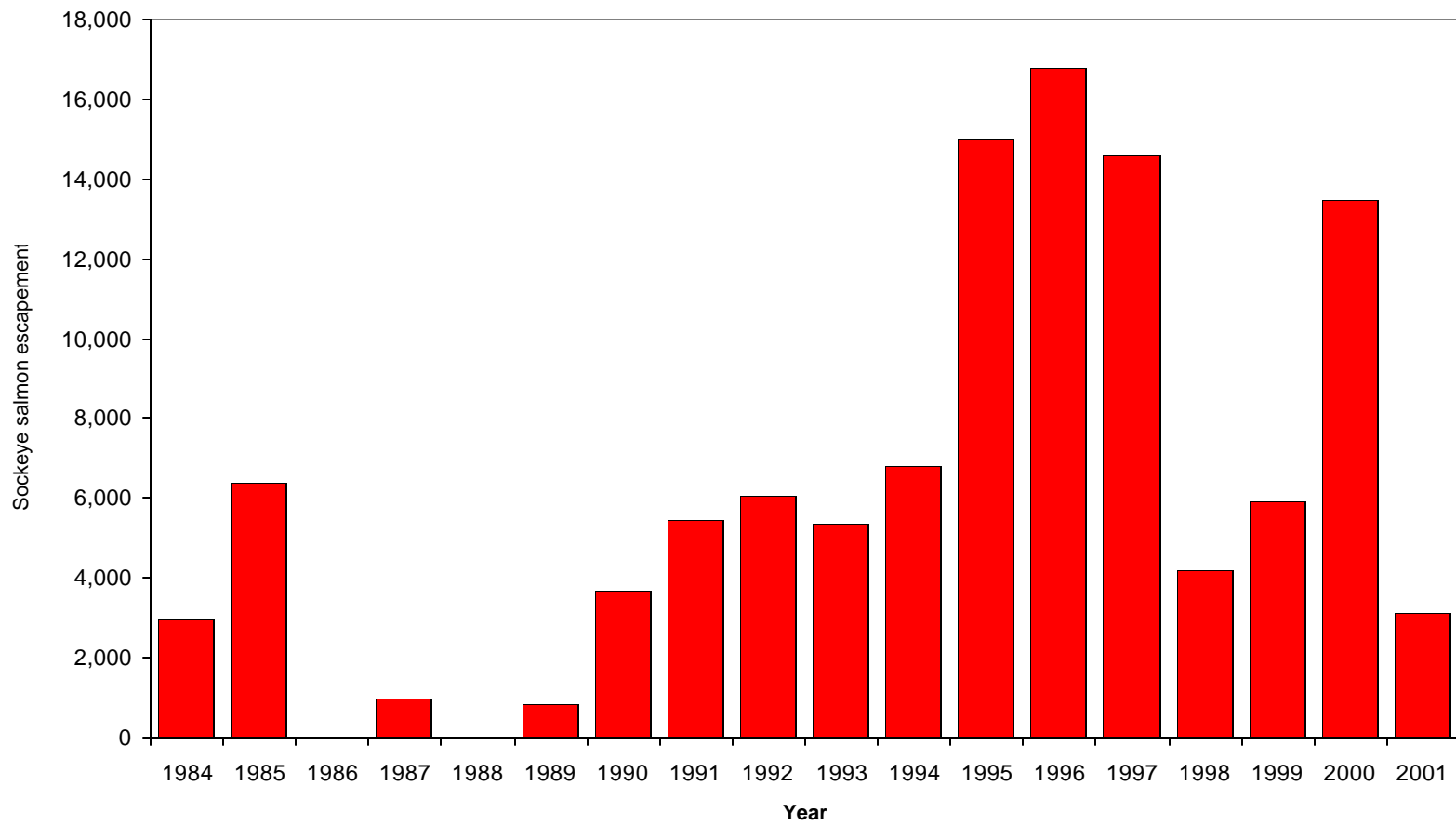


Figure 5. Comparison of sockeye salmon escapement at Portage Creek in the Kodiak Management Area, 1984 to 2001.

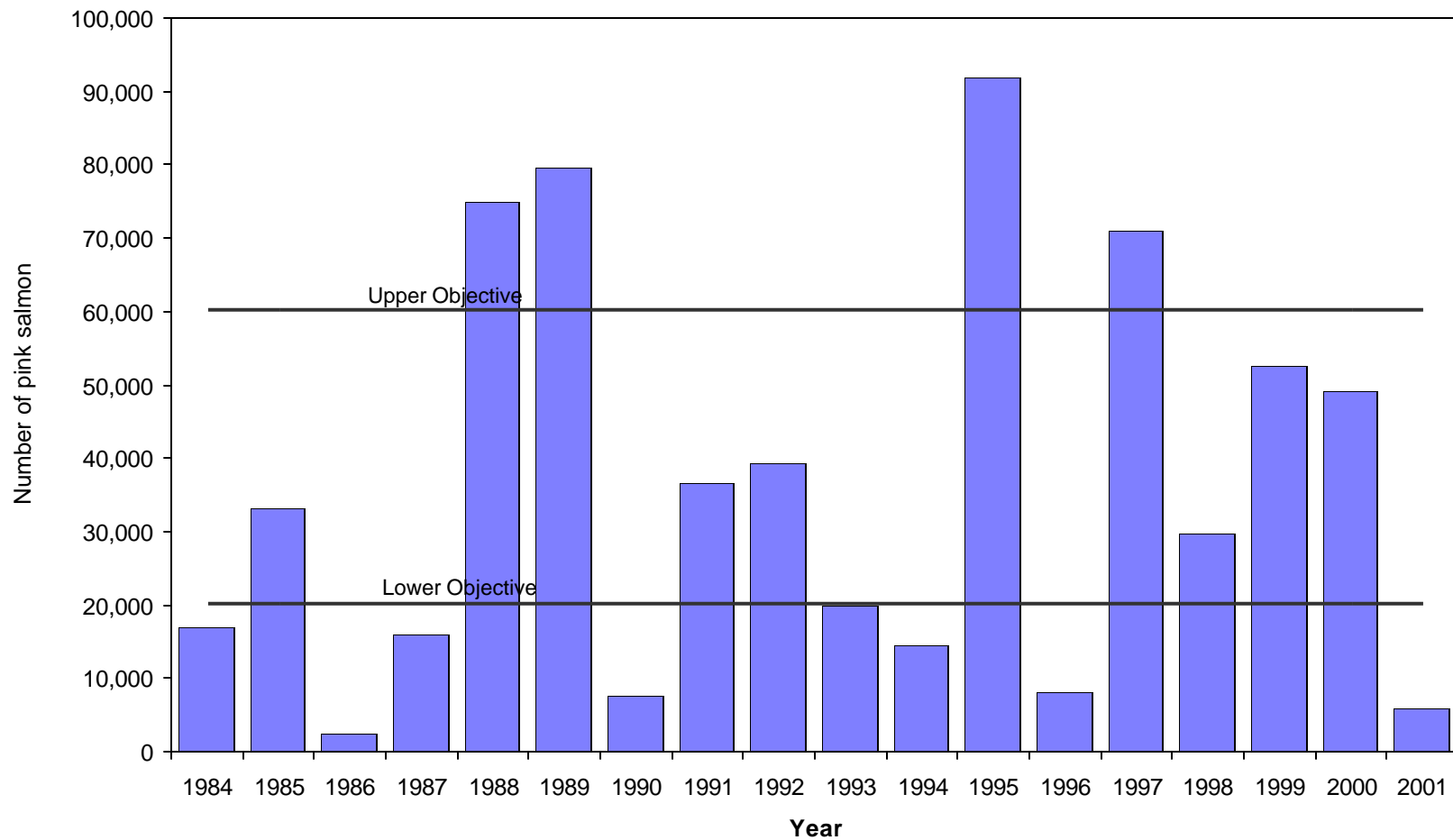


Figure 6. Comparison of pink salmon escapement to the upper and lower escapement objectives at Perenos Bay in the Kodiak Management Area, 1984 to 2001.

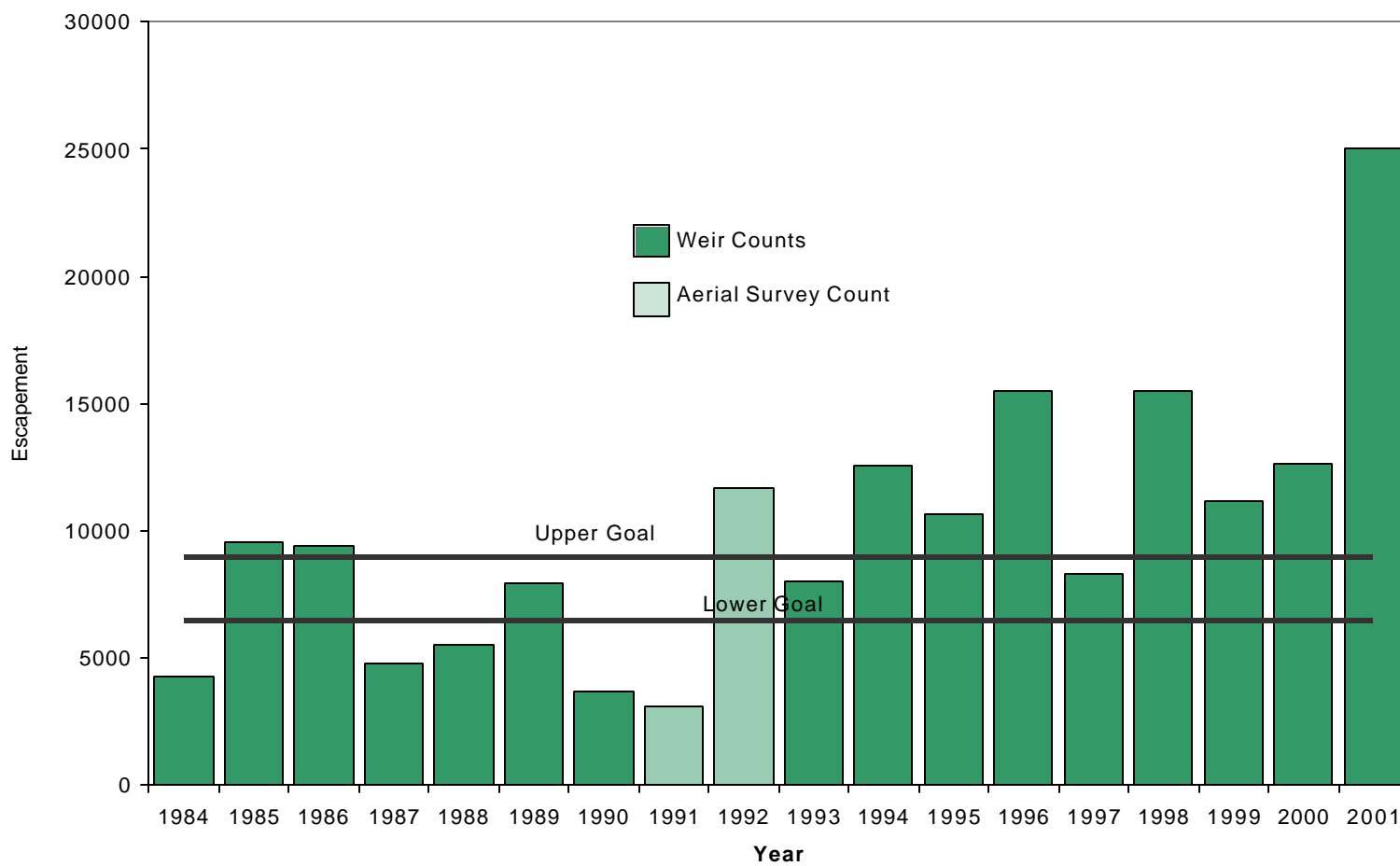


Figure 7. Comparison of coho salmon escapement to the upper and lower escapement goals at Pauls Creek in the Kodiak Management Area, 1984 to 2001.

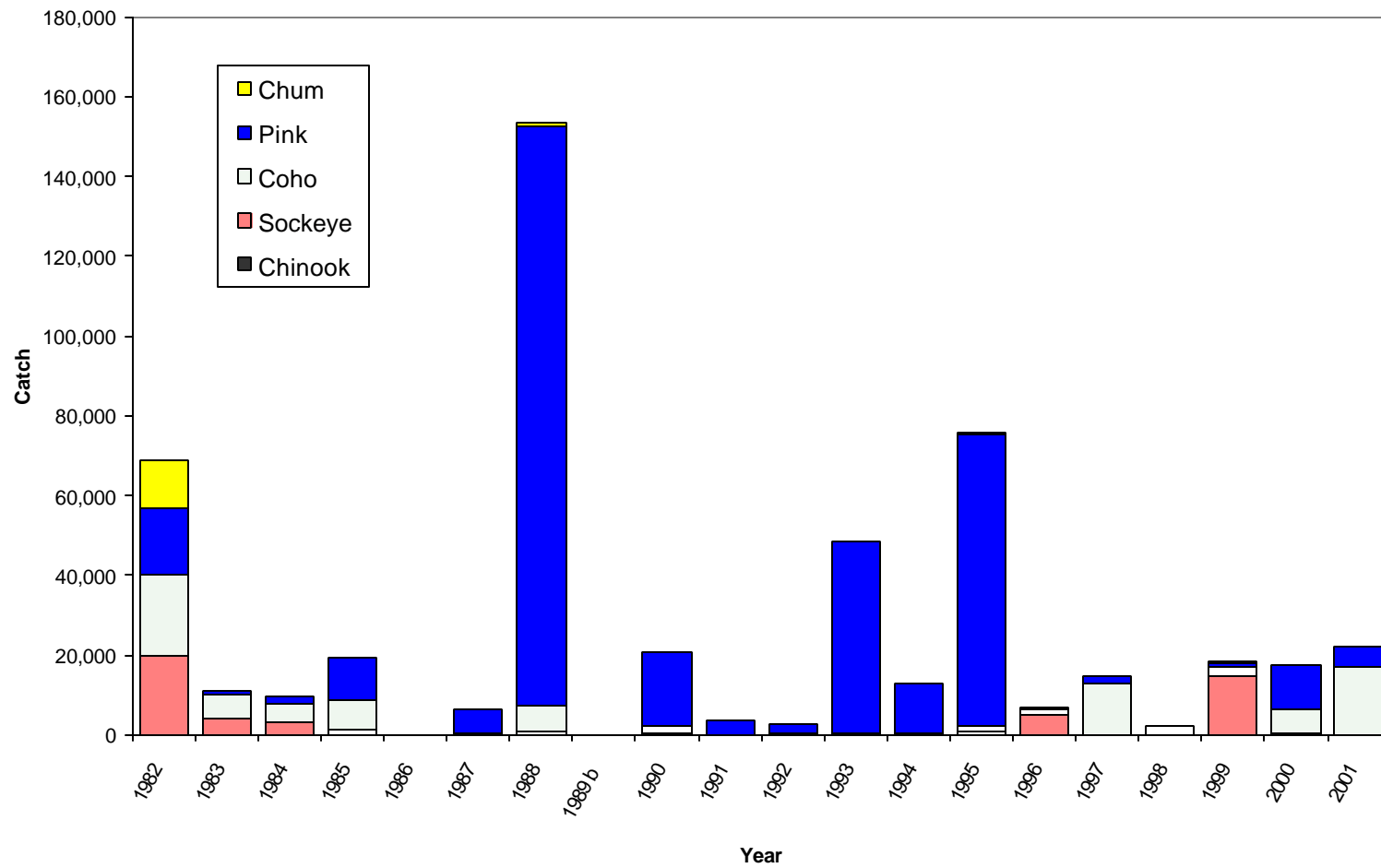


Figure 8. Annual commercial salmon harvest, by species, for the Perenosa Bay Section of the Kodiak Management Area, 1982 to 2001.

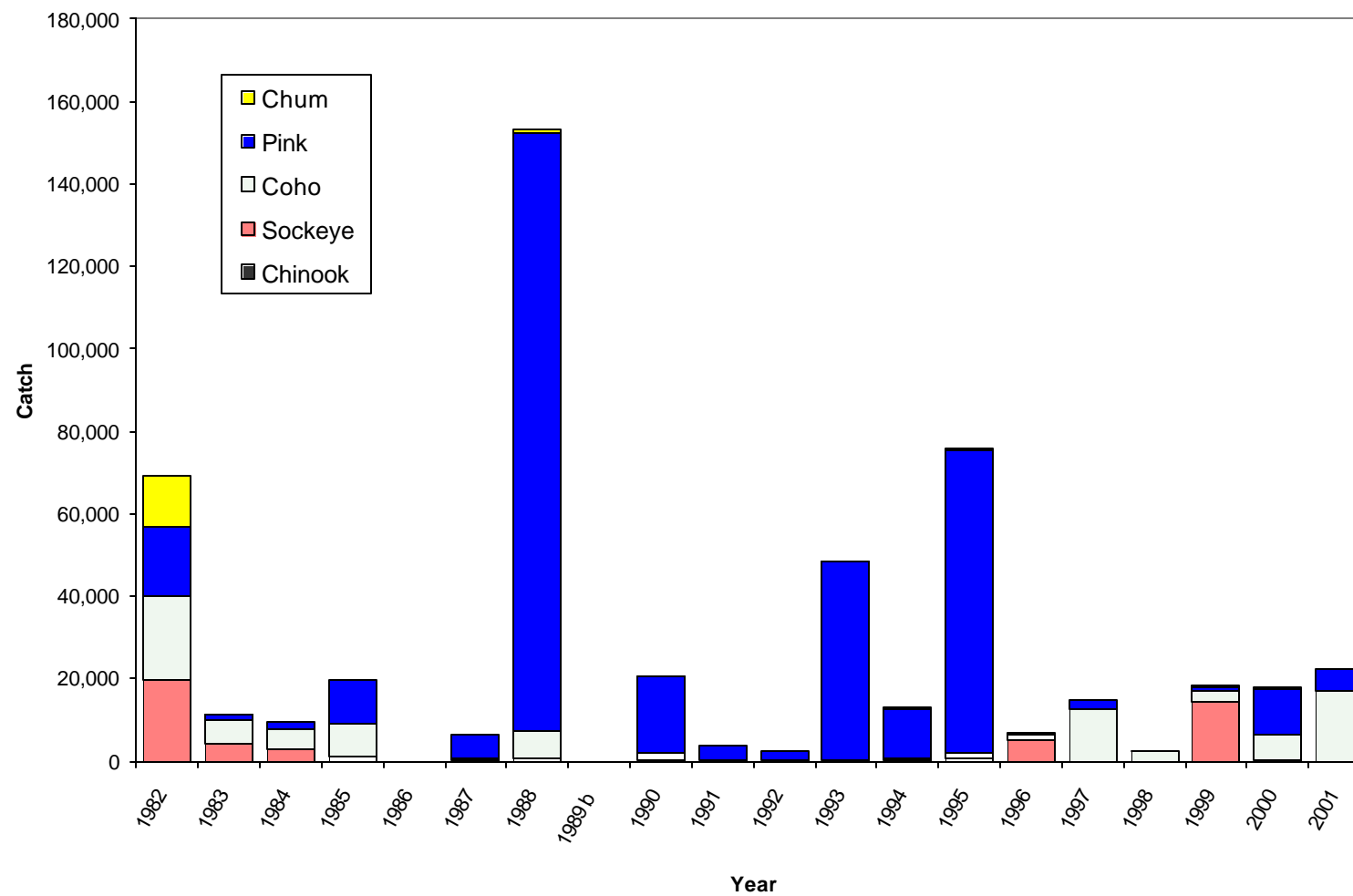
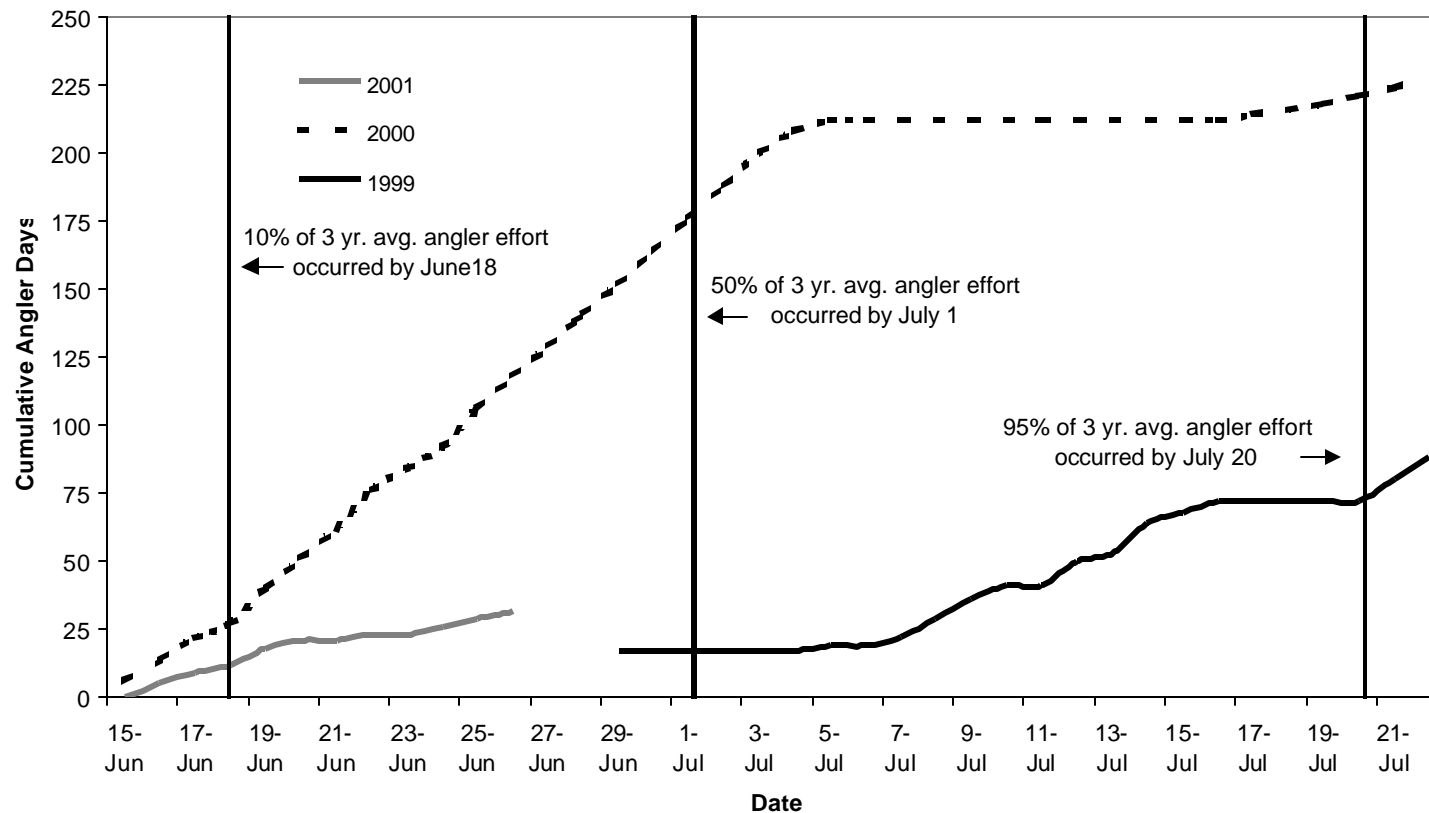
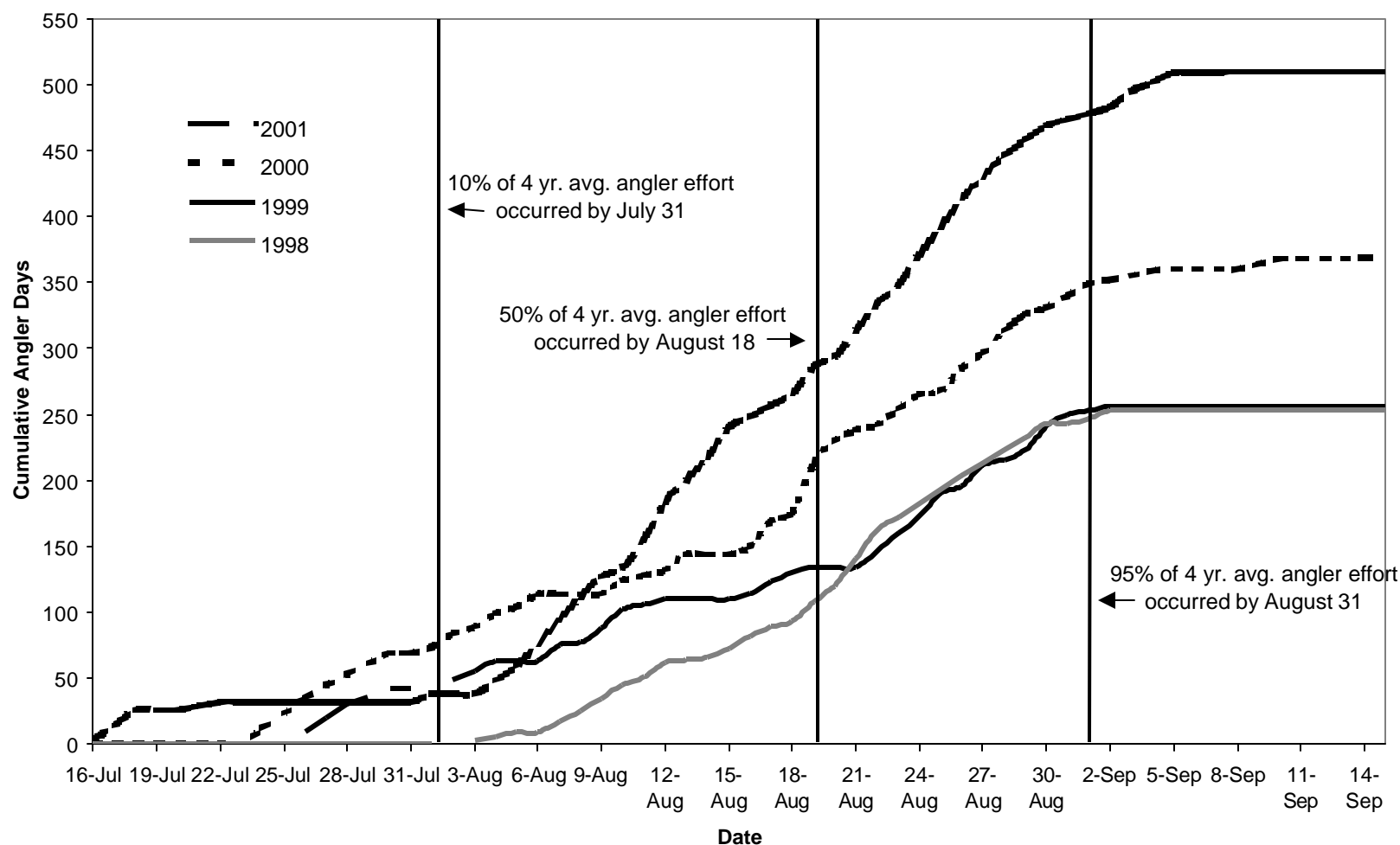


Figure 9. Annual commercial salmon harvest, by species, for the Pauls Bay statistical area (251-831) of the Kodiak Management Area, 1982 to 2001.



Source: Unpublished data from the ADF&G Saltwater Charter Vessel Logbook Program; 2001 results preliminary.

Figure 10. Saltwater charter vessel cumulative angler effort for sockeye salmon at Pauls Bay, Afognak Island, between 1999 and 2001.



Source: Unpublished data from the ADF&G Saltwater Charter Vessel Logbook Program; 2001 results preliminary

Figure 11. Saltwater charter vessel cumulative angler effort for coho salmon at Pauls Bay, Afognak Island, between 1998 and 2001.

APPENDIX

Appendix A. Primary management species and management chronology for the North Afognak/Shuyak Island Salmon Management Plan for the Kodiak Management Area, 2001.

NORTH AFOGNAK/SHUYAK ISLAND SALMON MANAGEMENT PLAN					
	6/9	7/6	7/21	8/21 8/25	9/6
NORTHEAST AFOGNAK SECTION	CLOSED	LOCAL AND MIXED PINK SALMON		LOCAL PINK & COHO SALMON	LOCAL COHO SALMON
PERENOSA ^a BAY SECTION	PAULS BAY AND PORTAGE LAKE SOCKEYE SALMON	LOCAL AND MIXED PINK SALMON, AND PAULS & PORTAGE SOCKEYE SALMON	LOCAL & MIXED PINK SALMON	LOCAL PINK & COHO SALMON	LOCAL COHO SALMON
SHUYAK ^b ISLAND SECTION	CLOSED	LOCAL AND MIXED PINK SALMON		LOCAL COHO SALMON	
NORTHWEST ^c AFOGNAK SECTION	THORSHEIM & LONG LAGOON SOCKEYE SALMON	LOCAL AND MIXED PINK SALMON		LOCAL COHO SALMON	

^a Additional fishing time to harvest enhanced sockeye bound to Waterfall Lake will occur only in the Waterfall Lake Terminal Harvest Area.

^b From July 6 to 25 this section must also be managed in accordance with the North Shelikof Strait Sockeye Salmon Management Plan.

^c Additional fishing time to harvest enhanced sockeye bound to Hidden Lake will only occur in the Foul Bay Terminal Harvest Area. From July 6 to 25 this section must also be managed in accordance with the North Shelikof Strait Sockeye Salmon Management Plan.

The Alaska Department of Fish and Game administers all programs and activities free from discrimination on the bases of race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility, or if you desire further information please write to ADF&G, P.O. Box 25526, Juneau, AK 99802-5526; U.S. Fish and Wildlife Service, 4040 N. Fairfield Drive, Suite 300, Arlington, VA 22203 or O.E.O., U.S. Department of the Interior, Washington DC 20240.

For information on alternative formats for this and other department publications, please contact the department ADA Coordinator at (voice) 907-465-4120, (TDD) 907-465-3646, or (FAX) 907-465-2440.